AMENDMENTS TO THE CLAIMS

Please amend claims 1, 3, 4, 7-17, 19, 21, 22, 24, 30-34, 40-42, 44, 46, 49, 86, 87, 93, 102 and 103 by substituting, respectively, the following rewritten claims:

1. (Currently amended) A method of degrading a predetermined substrate used for hydrocarbon exploitation comprising:

providing a fluid or a solid, or a mixture thereof, containing a substrate-degrading agent inactivated by sequestration, said inactivated substrate-degrading agent initially being substantially ~~unreactive~~ inactive ~~under normal conditions of use of said fluid or solid or mixture thereof~~, and subsequently becoming active in ~~responsive~~ response to a predetermined triggering signal ~~that is not present under said normal conditions of use~~; and

applying said triggering signal, other than a change in temperature or pressure of mechanically crushing by closing fractures or osmotic pressure, to said fluid or solid or mixture thereof such that said substrate-degrading agent becomes activated ~~upon exposure to said triggering signal~~, the activated substrate-degrading agent being capable of at least partially degrading the substrate ~~under degradation promoting conditions~~.

2. (Previously amended) The method of claim 1 wherein said sequestration comprises encapsulation of said substrate-degrading agent to provide an inactivated substrate-degrading agent.

3. (Currently amended) ~~The method of claim 1~~ A method of degrading a predetermined substrate used for hydrocarbon exploitation comprising:

providing a fluid or a solid, or a mixture thereof, containing a substrate-degrading agent inactivated by sequestration, said inactivated substrate-degrading agent initially being substantially inactive, and subsequently becoming active in responsive to a predetermined triggering signal; and

applying the triggering signal to said fluid or solid or mixture thereof such that said substrate-degrading agent becomes activated, the activated substrate-degrading agent being capable of at least partially degrading the substrate, ~~wherein the step of applying a~~ said triggering signal comprising ~~comprises exposing the inactivated substrate degrading agent to a stimulus~~being

selected from the group consisting of exposure to a reducing agent, oxidizer, chelating agent, radical initiator, carbonic acid, ozone, chlorine, bromine, peroxide, electric current, ultrasound, change in pH, change in salinity, and change in ion concentration, and change in pressure other than mechanically crushing by closing fractures or osmotic pressure.

4. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to a change in pH environment.

5. (Previously amended) The method of claim 4 wherein said step of exposing the inactivated substrate-degrading agent to a change in pH comprises lowering the pH environment.

6. (Previously amended) The method of claim 5 wherein said step of lowering the pH environment comprises exposing the inactivated substrate-degrading agent to carbonic acid.

7. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to a change in salinity.

8. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to a reducing agent.

9. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to an oxidizer.

10. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to a chelating agent.

11. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to a radical initiator.

12. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to ozone.

13. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to chlorine or bromine.

14. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to peroxide.

15. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to an electric current.

16. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to ultrasound.

17. (Currently amended) The method of claim ~~1~~ 3 wherein said step of applying a triggering signal comprises exposing the inactivated substrate-degrading agent to a change in ion concentration.

18. (Cancelled)

19. (Currently amended) The method of claim 1 ~~wherein said step of applying a triggering signal comprises~~ further comprising exposing the inactivated substrate-degrading agent to a change in pressure other than mechanically crushing by closing fractures or osmotic pressure.

20. (Previously amended) The method of claim 1 wherein said substrate-degrading agent comprises at least one agent chosen from enzymes, microorganisms, spores and inorganic chemicals.

21. (Currently amended) The method of claim 20 wherein said sequestration comprises encapsulating said substrate-degrading agent with an encapsulating material that maintains the

substrate-degrading agent substantially ~~unreactive~~ inactive initially ~~under normal conditions of use of said fluid or solid or mixture thereof~~, and is responsive to said triggering signal such that at least a portion of said substrate-degrading agent is released by said encapsulating material upon exposure to said triggering signal.

22. (Currently amended) The method of claim ~~21~~ 2 wherein said encapsulating material is formed of a co-polymer of (a) an ethylenically unsaturated hydrophobic monomer with (b) a free base monomer of the formula

$$CH_2 = CR^1COXR^2NR^3R^4$$

where R is hydrogen or methyl, R^2 is alkylene containing at least two carbon atoms, X is O or NH, R^3 is a hydrocarbon group containing at least 4 carbon atoms and R^4 is hydrogen or a hydrocarbon group.

23. (Original) The method of claim 22 wherein R^3 is t-butyl and R^4 is hydrogen.

24. (Currently amended) The method of claim 22 wherein R^1 is methyl, ~~R2~~ R^2 is ethylene and X is O.

25. (Original) The method of claim 22 wherein the hydrophobic monomer is a styrene or methylmethacrylate.

26. (Original) The method of claim 22 wherein said encapsulating material is a co-polymer of styrene or methyl methacrylate with t-butyl amino ethyl methacrylate.

27. (Original) The method of claim 22 wherein said co-polymer is 55 to 80 weight% styrene, methyl styrene or methyl methacrylate with 20 to 45 weight% t-butylamino-ethyl methacrylate.

28.-29. (Cancelled)

30. (Currently amended) The method of claim 21 wherein the fluid or solid comprises at least two inactivated substrate-degrading agents, wherein the inactivated substrate-degrading agents are

capable of being ~~reactivated~~ activated by the same or different triggering signals, such that upon ~~reactivation~~ activation the ~~reactivated~~ activated substrate-degrading agents are capable of acting upon the same or different substrates independently or in concert.

31. (Currently amended) The method of claim ~~21~~ 20 wherein said substrate-degrading agent comprises an endo-amylase.

32. (Currently amended) The method of claim ~~21~~ 20 wherein said substrate-degrading agent is alpha-amylase.

33. (Currently amended) The method of claim ~~21~~ 20 wherein said substrate-degrading agent comprises an enzyme selected from the group consisting of exo-amylases, isoamylases, glucosidases, amylo-glucosidases, malto-hydrolases, maltosidases, isomalto-hydrolases and malto-hexaosidases.

34. (Currently amended) The method of claim ~~21~~ 20 wherein the released substrate-degrading agent is capable of being deactivated ~~activated~~ by application of a second triggering signal, wherein the second triggering signal may be the same or a different triggering signal, such that the ~~inactivated~~ deactivated substrate-degrading agent no longer acts on the substrate.

35. (Previously amended) The method of claim 1 wherein the degradable substrate is selected from the group consisting of celluloses, derivatized celluloses, starches, derivatized starches, xanthans and derivatized xanthans.

36. (Previously amended) The method of claim 1 wherein the fluid is chosen from the group consisting of circulating drilling fluid, completion fluid, stimulation fluid, gravel packing fluid and workover fluid.

37. (Original) The method of claim 1 wherein the fluid is a fracturing fluid.

38. (Cancelled)

39. (Previously amended) The method of claim 1 wherein said solid comprises a device or particle suitable for use downhole or on the surface for hydrocarbon exploitation.

40. (Currently amended) A method of increasing the flow of hydrocarbons from a well, the method comprising:

providing a fluid comprising a degradable polymeric substrate and a substrate-degrading agent inactivated by sequestration, said inactivated substrate-degrading agent being substantially ~~unreactive~~ inactive initially ~~under the normal conditions of use of the fluid or solid or mixture thereof~~, and becoming active in responsive to a predetermined triggering signal ~~not present under said normal conditions of use, and said inactivated substrate degrading agent being responsive to a predetermined triggering signal~~;

introducing the fluid into a downhole environment; and,

applying ~~a~~ the triggering signal other than a change in temperature or pressure of mechanically crushing by closing fractures on the fluid or osmotic pressure, the triggering signal being sufficient to ~~reactivate~~ activate the inactivated enzyme to give ~~a reactivated~~ an activated substrate-degrading agent,

the ~~reactivated~~ activated substrate-degrading agent being capable of selectively degrading the substrate sufficient to alter a physical property of the fluid or a solid formed therefrom such that the flow of hydrocarbons from said well is increased.

41. (Currently amended) The method of claim 40 comprising:

carrying out drilling activity wherein said fluid comprises a circulating drilling fluid containing ~~an enzyme degradable~~the polymeric substrate and the inactivated substrate-degrading agent, wherein the agent comprises an inactivated enzyme that is capable of withstanding the dynamic environmental conditions ~~generating~~ generated while drilling; and

forming a low-permeability filter cake or fluid invasion zone containing said degradable polymeric substrate and said inactivated enzyme, said low-permeability filter cake or fluid invasion retaining low-permeability until receipt of said triggering signal sufficient to ~~reactivate~~ activate at least a portion of said enzyme.

42. (Currently amended) The method of claim 40 wherein the ~~fluid~~ agent comprises more than one inactivated enzyme, wherein the inactivated enzymes are capable of being activated by the same or different triggering signals, wherein upon activation the activated enzymes are capable of acting upon the same or different substrates.

43. (Previously amended) The method of claim 40 wherein the fluid is chosen from the group consisting of a circulating drilling fluid, a completion fluid, a workover fluid, a fracturing fluid, a gravel packing fluid and a stimulation fluid.

44. (Currently amended) A method of degrading filter cake, the method comprising:

providing a fluid comprising a polymeric viscosifier or fluid loss control agent and an enzyme inactivated by sequestration, said inactivated enzyme being responsive to a predetermined triggering signal;

introducing the fluid into a downhole environment such that a filter cake containing said polymeric viscosifier or fluid loss control agent and said inactivated enzyme is formed;

applying ~~a~~ the triggering signal, other than a change in temperature or pressure of mechanically crushing by closing fractures or osmotic pressure, to ~~reactivate~~ activate the inactivated enzyme to give ~~a reactivated~~ an activated enzyme,

the ~~reactivated~~ activated enzyme being capable of selectively degrading said polymeric viscosifier or fluid loss control agent such that said filter cake containing said viscosifier or fluid loss control agent at least partially disintegrates.

45. (Original) The method of claim 44 further comprising dislodging a piece of drilling equipment from said at least partially disintegrated filter cake.

46. (Currently amended) A method of degrading a contaminant arising from a subterranean formation comprising:

providing a fluid comprising a ~~substrate~~-degrading agent inactivated by sequestration, said inactivated ~~substrate~~-degrading agent being responsive to a predetermined triggering signal;

introducing the fluid into a downhole environment that ~~may contain~~contains ~~a predetermined~~ said contaminant, which ~~that~~ is ~~a substrate~~ capable of being degraded by said ~~substrate~~ degrading agent ~~under degradation promoting conditions~~; ~~and~~

applying a triggering signal, other than a change in temperature or pressure of mechanically crushing by closing fractures or osmotic pressure ~~on the fluid, either by direct action or by the action of the contaminant~~, the triggering signal being sufficient to ~~reactivate~~ activate the inactivated ~~substrate~~ degrading agent to give ~~a reactivated~~an activated agent~~,~~; and

allowing the ~~reactivated substrate~~ activated degrading agent to degrade the contaminant.

47. (Previously amended) The method of claim 46 wherein the fluid is a circulating drilling fluid, completion fluid, gravel packing fluid or workover fluid.

48. (Original) The method of claim 46 wherein the contaminant is H_2S.

49. (Currently amended) A wellbore treatment method comprising:

providing a fluid or a solid, or mixture thereof, containing a substrate-degrading agent inactivated by sequestration, said inactivated substrate-degrading agent being responsive to a predetermined triggering signal such that said substrate-degrading agent becomes activated upon exposure to said triggering signal, the activated substrate-degrading agent being capable of degrading ~~said~~a previously existing downhole substrate ~~under degradation promoting conditions~~;

introducing said fluid or solid, or mixture thereof, into a downhole environment ~~containing~~ that contains a said substrate; and

providing said ~~trigger~~ triggering signal, other than a change in temperature or pressure of mechanically crushing by closing fractures or osmotic pressure, to activate the substrate-degrading agent; and

allowing the substrate-degrading agent to at least partially degrade the substrate.

50-85. (Cancelled)

86. (Currently amended) The method of claim 1 ~~wherein said degradation promoting conditions comprise said normal conditions of use of said fluid or solid or mixture thereof~~comprising allowing said substrate to at least partially degrade.

87. (Currently amended) The method of claim 1 ~~wherein said degradation promoting conditions comprise an alteration of said normal~~comprising initial conditions of use of said fluid or solid or mixture thereof, and subsequent conditions of use of said fluid or solid or mixture thereof, resulting from said applying said triggering signal.

88. (Original) The method of claim 1 wherein said fluid or solid contains said degradable substrate.

89. (Original) The method of claim 88 wherein said solid comprises a filter cake or a bridging particle.

90. (Original) The method of claim 88 comprising allowing said substrate to degrade whereby a physical property of said fluid or solid is altered, said triggering signal being incapable of effecting said alteration if applied in the absence of said inactivated substrate-degrading agent.

91. (Original) The method of claim 5 wherein said step of lowering the pH environment comprises reducing the pressure within an excavation so that naturally-occurring carbonic acid, hydrosulfuric acid, or other naturally occurring acid or precursors thereof, previously excluded from said excavation by application of higher pressure, enter into said excavation to lower the pH environment of the inactivated substrate-degrading agent.

92. (Original) The method of claim 46 wherein said triggering signal comprises said contaminant.

93. (Currently amended) The method of claim 1 wherein said inactivated substrate-degrading agent is separate from said substrate and said method comprises:

supplying said triggering signal to said fluid or solid or mixture thereof containing said inactivated substrate-degrading agent such that said substrate-degrading agent becomes activated; and

exposing said activated substrate-degrading agent to said substrate.

94. (Original) The method of claim 1 wherein said inactivated substrate-degrading agent comprises particles up to about 74 microns in diameter.

95. (Original) The method of claim 1 wherein said inactivated substrate-degrading agent is capable of withstanding shear forces generated during drilling.

96. (Original) The method of claim 1 wherein said inactivated substrate-degrading agent is capable of withstanding dynamic exposure to drilling temperatures.

97. (Original) The method of claim 96 wherein said inactivated substrate-degrading agent is capable of withstanding dynamic exposure to temperatures up to 200°F.

98. (Original) The method of claim 1 wherein said substrate-degrading agent is chosen from enzymes, microorganisms, spores, oxidizers and acids.

99. (Original) The method of claim 98 wherein said acid is derived from a neutral polymer.

100. (Original) The method of claim 99 wherein said neutral polymer is polyhydroxyacetic acid.

101. (Original) The method of claim 4 wherein said inactivated substrate-degrading agent comprises an encapsulating material that becomes permeable to said substrate-degrading agent after exposure to said pH change, and said method comprises applying said pH change whereby said substrate-degrading agent passes through said encapsulating material.

102. (Currently amended) A method of increasing the permeability of filter cake in a wellbore, the method comprising:

obtaining a polymeric viscosifier or fluid loss control agent and a breaking agent capable of degrading said polymeric viscosifier or fluid loss control agent;

encapsulating said breaking agent in an ionophoric encapsulating material to obtain an encapsulated breaking agent, said ionophoric encapsulating material being ~~permeable~~ impermeable to said breaking agent at a defined first pH and ~~impermeable~~ permeable to said breaking agent at a defined second pH;

carrying out drilling activity whereby a filter cake is formed comprising said polymeric viscosifier or fluid loss control agent and said encapsulated breaking agent, said filter cake having a first permeability to a defined wellbore fluid;

changing the pH of the filter cake from said first pH to said second pH, whereby permeability of said encapsulating material to said breaking agent changes such that said breaking agent becomes unencapsulated;

allowing said unencapsulated breaking agent to at least partially degrade said polymeric viscosifer or fluid loss control agent such that the permeability of said filter cake changes from said first permeability to a second permeability that is greater than said first permeability.

103. (Currently amended) The method of claim ~~44~~ 49 comprising removing said fluid from said downhole environment before applying said triggering signal.

104. (New) The method of claim 3 further comprising exposing the inactivated substrate-degrading agent to a change in pressure and/or temperature.

105. (New) The method of claim 1 wherein the fluid is a drilling fluid.

106. (New) The method of claim 39 wherein the solid comprises a perforation gun holder or a film sheath for a sand screen assembly.

107. (New) The method of claim 40 wherein said sequestration comprises encapsulation of said substrate-degrading agent.

108. (New) The method of claim 40 further comprising exposing said inactivated substrate-degrading agent to a change in pressure and/or temperature.

109. (New) The method of claim 40 wherein said triggering signal comprises exposing said inactivated substrate-degrading agent to a downhole reversal of pressure differentials.

110. (New) The method of claim 40 wherein said substrate-degrading agent comprises at least one enzyme.

111. (New) The method of claim 40 wherein said fluid comprises a drilling fluid.

112. (New) The method of claim 46 wherein said triggering signal comprises exposing said inactivated agent to said contaminant.

113. (New) The method of claim 46 further comprising exposing said inactivated degrading agent to a change in pressure.

114. (New) The method of claim 46 further comprising exposing said inactivated degrading agent to a change in temperature.

115. (New) The method of claim 46 wherein said sequestration comprises encapsulation of said degrading agent.

116. (New) The method of claim 49 further comprising exposing said inactivated degrading agent to a change in pressure.

117. (New) The method of claim 49 further comprising exposing said inactivated degrading agent to a change in temperature.

118. (New) The method of claim 49 wherein said sequestration comprises encapsulation of said degrading agent.

119. (New) The method of claim 49 wherein said degrading agent comprises at least one enzyme.

120. (New) The method of claim 49 wherein said fluid comprises a drilling fluid.

121. (New) The method of claim 102 wherein said breaking agent comprises at least one enzyme.

122. (New) The method of claim 22 wherein the fluid is chosen from the group consisting of a circulating drilling fluid, a completion fluid, a workover fluid, a fracturing fluid, a gravel packing fluid and a stimulation fluid.

123. (New) The method of claim 22 wherein said solid comprises a device or particle suitable for use downhole or on the surface for hydrocarbon exploitation.

124. (New) The method of claim 123 wherein said solid comprises a filter cake or a bridging particle.

125. (New) The method of claim 1 further comprising exposing said inactivated degrading agent to a change in temperature.

126. (New) The method of claim 44 further comprising exposing said inactivated degrading agent to a change in pressure.

127. (New) The method of claim 44 further comprising exposing said inactivated degrading agent to a change in temperature.

128. (New) The method of claim 44 wherein said sequestration comprises encapsulation of said degrading agent.

129. (New) The method of claim 44 wherein said fluid comprises a drilling fluid.